Question	Scheme	Marks	AOs
9(a)	Take moments about A (or any other complete method to produce an equation in S, W and α only)	M1	3.3
	$Wa\cos\alpha + 7W2a\cos\alpha = S\,2a\sin\alpha$	A1 A1	1.1b 1.1b
	Use of $\tan\alpha = \frac{5}{2}$ to obtain S	M1	2.1
	$S = 3W$ *	A1*	2.2a
		(5)	
(b)	$R = 8W$	B1	3.4
	$F = \frac{1}{4} R\ (= 2W)$	M1	3.4
	$P_{MAX} = 3W + F$ or $P_{MIN} = 3W - F$	M1	3.4
	$P_{MAX} = 5W$ or $P_{MIN} = W$	A1	1.1b
	$W \leq P \leq 5W$	A1	2.5
		(5)	
(c)	M(A) shows that the reaction on the ladder at B is unchanged	M1	2.4
	also R increases (resolving vertically)	M1	2.4
	which increases max F available	M1	2.4
		(3)	
			(13 marks)

Question 9 continued

Notes:

(a)

1st M1: for producing an equation in S, W and α only

1st A1: for an equation that is correct, or which has one error or omission

2nd A1: for a fully correct equation

2nd M1: for use of $\tan\alpha = \frac{5}{2}$ to obtain S in terms of W only

3rd A1*: for given answer $S = 3W$ correctly obtained

(b)

B1: for $R = 8W$

1st M1: for use of $F = \frac{1}{4} R$

2nd M1: for either $P = (3W + \text{their } F)$ or $P = (3W - \text{their } F)$

1st A1: for a correct max or min value for a correct range for P

2nd A1: for a correct range for P

(c)

1st M1: for showing, by taking moments about A, that the reaction at B is unchanged by the builder's assistant standing on the bottom of the ladder

2nd M1: for showing, by resolving vertically, that R increases as a result of the builder's assistant standing on the bottom of the ladder

3rd M1: for concluding that this increases the limiting friction at A